



Experiment 3

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1. Aim:

To design and implement Java programs with exception handling to validate user input, simulate ATM operations, and manage university course enrollment.

- To handle runtime errors using try-catch blocks, throw custom exceptions, and ensure program robustness.

◆ Part A – Easy Level:

- To create a Java program that calculates the square root of a number entered by the user.
- To handle invalid inputs such as negative numbers or non-numeric values using exception handling.

◆ Part B – Medium Level:

- To create a Java program simulating an ATM system with PIN verification and balance withdrawal.
- To implement nested try-catch blocks and custom exceptions for invalid PINs or insufficient balance.

◆ Part C – Hard Level:

- To create a Java program for a university enrollment system with courses and prerequisites.
- To implement user-defined exceptions such as CourseFullException and PrerequisiteNotMetException to enforce business rules.

2. Objective:

- ✓ To understand the concept of exception handling in Java.
- ✓ To implement try-catch blocks to handle runtime errors and invalid inputs.
- ✓ To create and use custom exception classes for specific application scenarios.
- ✓ To ensure program robustness and proper flow even when errors occur.



3. JAVA script and output:

EASY-LEVEL PROBLEM

```
package exp.pkg3;
```

```
import java.util.Scanner;
```

```
public class Exp3 {
```

```
    public static void main(String[] args) {
```

```
        Scanner sc = new Scanner(System.in);
```

```
        try {
```

```
            System.out.print("Enter a number: ");
```

```
            String input = sc.nextLine();
```

```
            double num = Double.parseDouble(input);
```

```
            if (num < 0) {
```

```
                throw new IllegalArgumentException("Cannot calculate the square root of a negative number");
```

```
            }
```

```
            double result = Math.sqrt(num);
```

```
            System.out.println("Square root of " + num + " is: " + result);
```

```
        } catch (NumberFormatException e) {
```

```
            System.out.println("Error: Invalid input! Please enter a numeric value.");
```

```
        } catch (IllegalArgumentException e) {
```

```
            System.out.println("Error: " + e.getMessage());
```



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```
}  
  
}  
  
}
```

OUTPUT:

```
run:  
Enter a number: 64  
Square root of 64.0 is: 8.0  
BUILD SUCCESSFUL (total time: 3 seconds)  
||
```

Figure 1: Easy Level

MEDIUM LEVEL PROBLEM:

```
package exp.pkg3;
```

```
import java.util.Scanner;
```

```
public class Exp3 {
```

```
    public static void main(String[] args) {
```

```
        Scanner sc = new Scanner(System.in);
```

```
        final int correctPIN = 1234;
```

```
        double balance = 3000.0;
```

```
        try {
```

```
            System.out.print("Enter PIN: ");
```

```
            int pin = sc.nextInt();
```

```
        if (pin != correctPIN) {  
            throw new SecurityException("Invalid PIN entered!");  
        }  
        System.out.print("Enter withdrawal amount: ");  
        double withdraw = sc.nextDouble();  
        try {  
            if (withdraw > balance) {  
                throw new Exception("Insufficient balance.");  
            }  
            balance -= withdraw;  
            System.out.println("Withdrawal successful! Amount withdrawn: " + withdraw);  
        } catch (Exception e) {  
            System.out.println("Error: " + e.getMessage());  
        }  
        } catch (SecurityException e) {  
            System.out.println("Error: " + e.getMessage());  
        } finally {  
            System.out.println("Current Balance: " + balance);  
        }  
    }  
}
```

OUTPUT:

```
Enter PIN: 1234  
Enter withdrawal amount: 20000  
Error: Insufficient balance.  
Current Balance: 3000.0
```

Figure 2: Medium Level



HARD LEVEL PROBLEM

```
package exp.pkg3;
```

```
import java.util.*;
```

```
class Course {
```

```
    String courseName;
```

```
    int capacity;
```

```
    List<String> enrolledStudents = new ArrayList<>();
```

```
    String prerequisite;
```

```
    public Course(String courseName, int capacity, String prerequisite) {
```

```
        this.courseName = courseName;
```

```
        this.capacity = capacity;
```

```
        this.prerequisite = prerequisite;
```

```
    }
```

```
    public void enroll(String studentName, boolean prerequisiteCompleted) throws Exception {
```

```
        if (enrolledStudents.size() >= capacity) {
```

```
            throw new Exception("Course is full: " + courseName);
```

```
        }
```

```
        if (prerequisite != null && !prerequisiteCompleted) {
```

```
            throw new Exception("Complete " + prerequisite + " before enrolling in " +  
courseName);
```

```
        }
```



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```
        enrolledStudents.add(studentName);  
  
        System.out.println("Success: " + studentName + " enrolled in " + courseName);  
    }  
}
```

```
public class Exp3 {  
    public static void main(String[] args) {  
        Course advancedJava = new Course("Advanced Java", 2, "Core Java");  
  
        try {  
            advancedJava.enroll("Alice", false);  
        } catch (Exception e) {  
            System.out.println("Error: " + e.getMessage());  
        }  
  
        try {  
            advancedJava.enroll("Bob", true);  
        } catch (Exception e) {  
            System.out.println("Error: " + e.getMessage());  
        }  
  
        try {  
            advancedJava.enroll("Charlie", true);  
        } catch (Exception e) {  
            System.out.println("Error: " + e.getMessage());  
        }  
  
        try {  
            advancedJava.enroll("David", true);  
        } catch (Exception e) {
```



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```
        System.out.println("Error: " + e.getMessage());
    }
}
}
```

OUTPUT:

```
run:
Error: Complete Core Java before enrolling in Advanced Java
Success: Bob enrolled in Advanced Java
Success: Charlie enrolled in Advanced Java
Error: Course is full: Advanced Java
BUILD SUCCESSFUL (total time: 0 seconds)
```